CLAIMS

What is claimed is:

1. A re-writable memory comprising:

a semiconductor substrate;

a cross point memory array formed above the semiconductor substrate, including

at least one x-direction conductive layer that includes conductive array lines;

at least one y-direction conductive layer that includes conductive array lines; and

memory plugs;

at least one x-direction driver set that drives the at least one x-direction conductive layer, the at least one x-direction driver set being formed on the semiconductor substrate; and

at least one y-direction driver set that drives the at least one y-direction conductive layer, the at least one y-direction driver set being formed on the semiconductor substrate;

wherein the at least one x-direction driver set and the at least one y-direction driver set both use logic to drive isolated conductive array lines, and wherein at least one driver set is substantially underneath the cross point memory array.

2. The re-writable memory of claim 1, wherein:

a first portion of at least one driver set is positioned on a first side of the cross point array, and a second portion of the at least one driver set is positioned on the opposite side of the cross point array.

3. The re-writable memory of claim 2, wherein:

the first and second portions of the at least one driver set are interdigitated.

4. The re-writable memory of claim 3, wherein:

the at least one driver set substantially underneath the cross point array is the at least one x-direction driver set.

5. The re-writable memory of claim 4, wherein

the at least one y-direction driver set is not underneath the cross point memory array.

6. The re-writable memory of claim 4, wherein:

a portion of the at least one y-direction driver set is underneath the cross point memory array.

7. The re-writable memory of claim 3, wherein:

the at least one driver set substantially underneath the cross point array is the at least one y-direction driver set.

8. The re-writable memory of claim 7, wherein

the at least one x-direction driver set is not underneath the cross point memory array.

9. The re-writable memory of claim 2, wherein:

a portion of the at least one x-direction driver set is underneath the cross point memory array.

10. The re-writable memory of claim 2, wherein:

the first and second portions of the at least one driver set are not interdigitated.

11. The re-writable memory of claim 10, wherein:

all the driver sets are substantially underneath the cross point memory array.

12. The re-writable memory of claim 11, wherein:

there are at least four driver sets that drive three x-direction conductive layers and two y-direction conductive layers.

13. The re-writable memory of claim 12, wherein:

there are at least six driver sets that drive five x-direction conductive layers and four y-direction conductive layers.

14. The re-writable memory of claim 11, further comprising:

other peripheral circuitry that is formed in the semiconductor substrate and is substantially underneath the cross point memory array.

15. A re-writable memory comprising:

a semiconductor substrate;

a cross point array that is formed on top of the semiconductor substrate and electrically connected to the semiconductor substrate, the cross point array including a layer of x-direction conductive array lines, a layer of memory plugs, and a layer of y-direction conductive array lines;

an x-direction driver set formed on the semiconductor substrate, each driver within the set being electrically coupled to a single x-direction conductive array line on the layer of x-direction conductive array lines; and

a y-direction driver set formed on the semiconductor substrate, each driver within the set being operably connected to a single y-direction conductive array line on the layer of y-direction conductive array lines and being operable to drive a memory plug to a read voltage or a write voltage in conjunction with the x-direction driver set;

wherein at least one of the driver sets is substantially underneath the cross point memory array.

16. The re-writable memory of claim 15, wherein:

a first portion of at least one driver set is positioned on a first side of the cross point array, and a second portion of the at least one driver set is positioned on the opposite side of the cross point array.

17. The re-writable memory of claim 16, wherein:

the first and second portions of the at least one driver set are interdigitated.

18. The re-writable memory of claim 16, wherein:

the first and second portions of the at least one driver set are not interdigitated.

19. The re-writable memory of claim 15, wherein:

all the driver sets are substantially underneath the cross point memory array.

20. The re-writable memory of claim 19, wherein:

the cross point array has multiple layers of memory plugs.

21. A re-writable memory comprising:

a semiconductor substrate;

a cross point memory array formed above the semiconductor substrate, including

at least one x-direction conductive layer that includes conductive array lines;

at least one y-direction conductive layer that includes conductive array lines; and

memory plugs;

at least one x-direction driver set that drives the at least one x-direction conductive layer, the at least one x-direction driver set being formed on the semiconductor substrate; and

at least one y-direction driver set that drives the at least one y-direction conductive layer, the at least one y-direction driver set being formed on the semiconductor substrate;

wherein at least one x-direction driver set is entirely driving conductive array lines from one side of the conductive array.

22. The re-writable memory of claim 21, wherein:

the at least one x-direction driver set and the at least one y-direction driver set both use logic to drive isolated conductive array lines.

23. The re-writable memory of claim 21, wherein:

the at least one x-direction driver set is substantially underneath the cross point memory array.

24. The re-writable memory of claim 23, wherein:

all x-direction driver sets are substantially underneath the cross point memory array.

25. The re-writable memory of claim 21, wherein:

the memory plugs exhibit a non-linear resistive characteristic.

26. The re-writable memory of claim 25, wherein:

the memory plug includes a conductive metal oxide.

27. A re-writable memory comprising:

a semiconductor substrate;

a cross point memory array formed above the semiconductor substrate, including

at least one x-direction conductive layer that includes a portion of contiguous x-direction conductive array lines;

at least one y-direction conductive layer that includes a portion of contiguous y-direction conductive array lines; and

memory plugs;

at least one x-direction driver set that drives the at least one x-direction conductive layer, the at least one x-direction driver set including a non-interdigitated driver subset that

drives the portion of contiguous x-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the portion of contiguous x-direction conductive array lines from a first side of the cross point array; and at least one y-direction driver set that drives the at least one y-direction conductive layer, the at least one y-direction driver set being formed on the semiconductor substrate.

28. The re-writable memory of claim 27, wherein:

the non-interdigitated driver subset is placed underneath the cross point memory array.

29. The re-writable memory of claim 27, wherein:

the at least one x-direction conductive layer includes a second portion of contiguous x-direction conductive array lines; and

the at least one x-direction driver set includes a second non-interdigitated driver subset that

drives the second portion of contiguous x-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the second portion of contiguous x-direction conductive array lines from a second side of the cross point array, the second side being opposite from the first side.

30. The re-writable memory of claim 29, wherein:

the at least one y-direction driver set includes a second non-interdigitated driver subset that

drives the portion of contiguous y-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the portion of contiguous y-direction conductive array lines from a third side of the cross point array, the third side being adjacent to the first side.

31. The re-writable memory of claim 30, wherein:

the at least one y-direction conductive layer includes a second portion of contiguous y-direction conductive array lines; and

the at least one y-direction driver set includes a second non-interdigitated driver subset that

drives the second portion of contiguous y-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the second portion of contiguous y-direction conductive array lines from a fourth side of the cross point array, the fourth side being opposite from the third side.

32. The re-writable memory of claim 31, wherein:

the x-driver subsets and the y-driver subsets are placed underneath the cross point memory array.

33. The re-writable memory of claim 27, wherein:

the cross point memory array formed above the semiconductor substrate is one of a plurality of cross point memory arrays formed above the semiconductor substrate.

34. The re-writable memory of claim 33, wherein:

the memory is organized to read or write *N* bits of data at a time, and

the number of cross point memory arrays in the plurality of cross point memory arrays is *N* or a multiple of *N*.

35. The re-writable memory of claim 27, wherein:

the re-writable memory is a portable storage device.

36. The re-writable memory of claim 35, wherein:

the memory plugs exhibit a non-linear resistive characteristic.

37. The re-writable memory of claim 36, wherein:

the memory plug includes a conductive metal oxide.